

**REMARKS**

Initially, the undersigned greatly appreciates the helpful suggestions made by Examiner McNelis during a telephone interview on August 2, 2006. The substance of the interview is incorporated in the following remarks.

Claim 27 stands rejected under 35 USC §103(a) as allegedly unpatentable over Japanese Patent Publication 6-287640 ("Japan '640") in view of ASM Metals Handbook or Japanese Patent No. 2000-054301 ("Japan '301"). The reasons for the rejection are set forth on pages 3-4 of the Official Action. The rejection is respectfully traversed.

Claim 27 sets forth a method of manufacturing an ultra-low carbon steel sheet in which molten steel having a chemical composition including, in mass percent, C: at most 0.010%, Si: at most 0.5%, Mn: at most 1.5%, P: at most 0.12%, S: at most 0.030%, Al: at most 0.080%, N: at most 0.0080%, Ti: 0.002% ~ 0.10%, Nb: at most 0.05%, B: 0-0.0050%, V: 0-0.05%, and Ca: 0-0.0050% is subjected to refining in a converter, secondary refining after refining in the converter, continuous casting, hot rolling, and then coiling, wherein at the time of the secondary refining, the molten steel is tapped into a refining vessel, a vacuum immersion pipe having an interior that can be adjusted to a negative pressure is immersed in the molten steel in the refining vessel, and a stirring gas is blown into the molten steel.

The combinations of features recited in Claim 27 and in the claims dependent thereon are not disclosed or suggested by the combination of Japan '640 and the ASM Metals Handbook or Japan '301. In particular, whereas Claim 27 recites a method of manufacturing an ultra-low carbon steel sheet in which Ti is included in an amount of 0.002 to 0.10%, Japan '640 does not list Ti as an alloying element nor is

there any example in Japan '640 of a Ti-containing steel. Accordingly, Claim 27 and the claims dependent thereon are patentable over Japan '640.

In the Official Action, Japan '031 is cited for disclosure of adding Ti to react with C, N and S to improve workability (Official Action at page 4) and the ASM Metals Handbook is cited for disclosure of adding Ti to steels as a deoxidizer and to limit grain growth (Official Action at bottom of page 3) and it is alleged that it would have been obvious to modify Japan '640 to include Ti to deoxidize and limit grain growth (sentence bridging pages 3-4 of the Official Action). The ASM Metals Handbook states that Ti is "used as a deoxidizer and helps to limit grain growth in the fully killed steels." As such, the ASM Metal Handbook indicates that a deoxidizing amount of Ti would also limit grain growth presumably because enough Ti must be added to provide an excess of Ti required to combine with oxygen. However, an excess amount of Ti would result in formation of TiN and TiC as indicated by Japan '031 which would limit grain growth, a result contrary to Japan '640's requirement for grain growth.

Attachment A submitted herewith is a copy of page 20-1 of the Metals Handbook, 9<sup>th</sup> Edition which establishes that magnetically soft materials such as silicon steels and non-oriented materials should have a grain size "as large as possible". Japan '640 discloses a non-oriented silicon steel (see title) and according to the machine translation of Japan '640 the steel should be deoxidized with Al so that the steel is "excellent in the grain growth possibility" (see [0008] of translation). Accordingly, a person of ordinary skill in the art would not have been led by Japan '031 or the ASM Metals Handbook to add Ti to Japan '640 to limit grain growth or for

deoxidation since the excess Ti needed for deoxidation would also limit grain growth (see ASM Metals Handbook).

Claims 28-34 stand rejected under 35 USC §103(a) as allegedly unpatentable over Japan '640 in view of ASM Metals Handbook or Japan '031 and further in view of U.S. Patent No. 4,113,166 ("Ollson"), U.S. Patent No. 3,512,574 ("Taylor") or Japanese Patent Publication No. 2-672889 ("Japan '889"). The reasons for the rejection are set forth on page 4 of the Official Action. This rejection is respectfully traversed.

As explained above, Japan '640, the ASM Metals Handbook and Japan '031 do not suggest the method recited in Claim 27 of manufacturing an ultra-low carbon steel sheet in which Ti is included in an amount of 0.002 to 0.010%. Olsson, Taylor and Japan '889 are only cited in the Official Action for method features and thus do not cure the deficiencies of Japan '640 with regard to the recited steel composition. Accordingly, Claim 27 and the claims dependent thereon are patentable over Japan '640 in view of the secondary references.

It is submitted that the differences between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not have been obvious at the time the invention was made to a person having ordinary skill in the art.

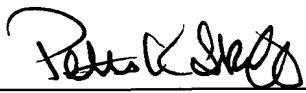
In view of the foregoing, it is submitted that the present application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: August 10, 2006

P.O. Box 1404  
Alexandria, Virginia 22313-1404  
(703) 836-6620

By:   
Peter K. Skiff  
Registration No. 31,917